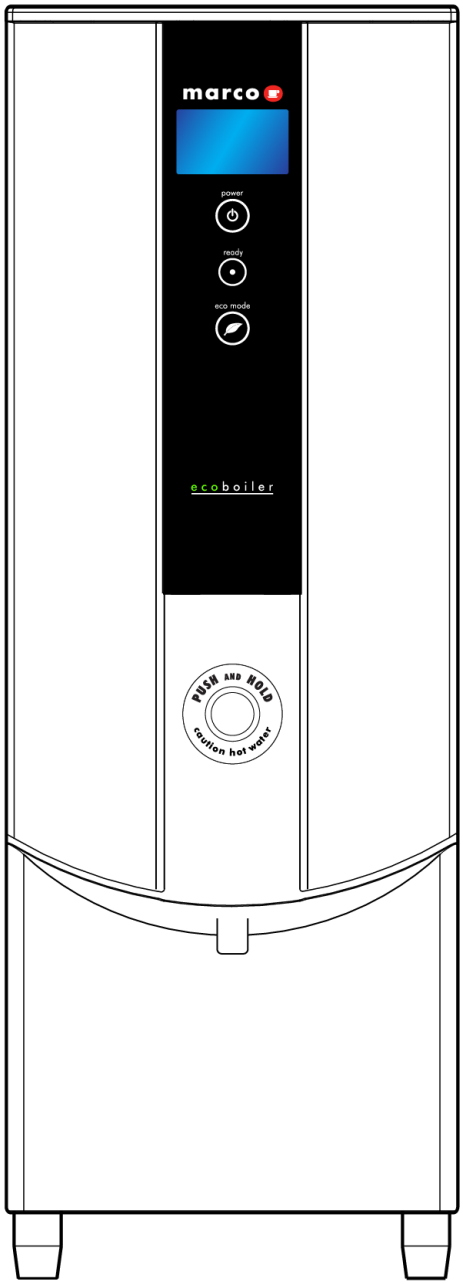
POURING PERFECTION

EcoSmart boiler

SERVICE MANUAL



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1. INTRODUCTION:

The information provided in this manual is intended to assist in the installation and maintenance of the Marco EcoSmart Boiler. Please read the instructions carefully to prevent accidents and ensure an efficient installation.

This manual is not a substitute for any safety instructions or technical data affixed to the machine or its packaging. All information in this manual is current at the time of publication and is subject to change without notice.

Only technicians or service providers authorised by Marco should carry out installation and maintenance of these machines.

Marco accepts no responsibility for any damage or injury caused by incorrect or unreasonable installation and operation.

2. SAFETY INSTRUCTIONS:

- Read all instructions.
- To protect against electric shock do not immerse mains cord in water or other liquid.
- To prevent chafing of the cable, do not let the mains cord hang over the edge of a table or counter ; or touch hot surfaces.
- Do not operate any appliance with a damaged cord, plugs, or after the appliance malfunctions or has been damaged in any manner.
- Switch off at the mains (unplug or disconnect from outlet) and turn off the water supply when not in use and before cleaning. Allow to cool before removing components.
- The use of spares and accessories not recommended by Marco may cause damage and/or injuries.
- Do not use outdoors. Do not place on or near a hot gas or electric burner.
- Do not use the appliance for anything other than its intended use.
- Save these instructions.

3. BASIC INSTRUCTIONS:

3.1. INSTALLATION DETAILS:

Electrical installation:

- Electrical specification: 2.8kW-230V-50Hz
- A moulded 13A plug is factory fitted. A suitable 13A outlet is all that is required.

Plumbing installation procedure:

- Mains water pressure required (limits): 5-50psi (35-345kPa)
- Fit a stop Valve on a cold water line and attach a 3/4" BSP male fitting,
- (e.g. 3/4" x 1/2" 311 or washing machine type stop valve).
- **Connect straight tailpiece of the hose to the stop valve fitting. Make sure that the pre-attached sealing washer is fitted.**
- Turn on the water to flush any impurities, dust etc from the inlet hose and water pipe. Allow several gallons through.
- Connect right-angled tailpiece of the hose to the inlet valve of the boiler (again 3/4" BSP). Make sure the sealing washer is fitted here also.
- Turn on water and check for leaks.

Operating boiler for the first time:

- Check that all installation procedures have been carried out.
- Ensure water valve is on.
- Plug boiler into 13A socket and press power button on the front of the machine marked ‘Power’. Refer to Figure 1.
- The “power on” light will glow green and the machine will fill to a safe level, above the elements, before heating. The display will show the current water temperature and the status “ Filling…”
- The “Ready/Status” light will cycle two red flashes while the machine is filling to the safe level.
- After this amount of water has heated to about 96ºC the boiler will draw more water in until the temperature drops by 1 or 2 degrees. The boiler will then heat again. This heat fill cycle continues until the boiler is full.
- While filling, the “Ready/Status” light will remain blank.
- The “Ready/Status” light will glow green when the machine is both full and up to normal operating temperature. For 10L machines allow approx 30 minutes.
- The boiler is now ready for use – the display will show the Water Temperature and the status “ READY”.
- The Boiler may now be used to dispense Hot Water to the preset factory settings.
    - 94’C
    - Push and Hold operation
    - Continuous flow – no pulsing
    - Auto heat Fill Mode.

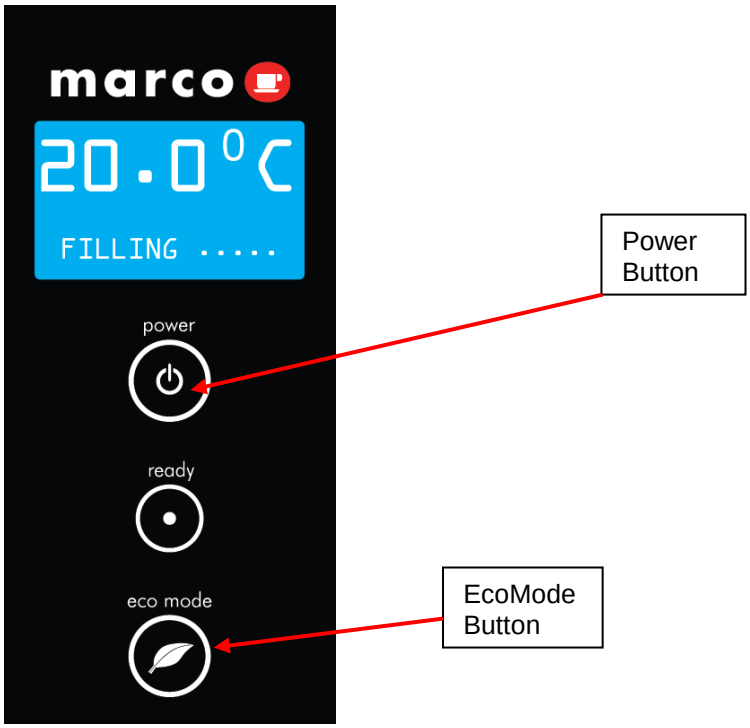


Figure 1: Machine User Interface

NOTE: Because the boiler is electronically controlled no priming is necessary.
The element cannot switch on until a safe level of water is reached.

PLEASE REFER TO INSTRUCTION BOOKLET FOR TEMPERATURE CALIBRATION.

3.2. TROUBLESHOOTING

The Ready/Status light signals various errors or problems.
A cycle of red flashes indicates an error. The number of flashes in a cycle corresponds to the symptom in the table below:

Status/Diagnostic light guide:

No of flashes	Symptom	Action required
2	Water level below elements. Normal when machine first fills.	Check water pressure , if this is OK then call service agent.
3	Temperature sensor failure (o/c)	Call service agent
4	Water not heating	Call service agent
5	Temperature sensor failure (s/c)	Call service agent
6	Machine not filling	Check water pressure. If OK – switch machine off and on again. If problem reoccurs - call service agent.

Note: Some of the error sequences will be displayed if there is low water pressure. Please check that there is water pressure and that the water stop-valve is open before calling your service agent.

For a more detailed description of error indicators and corrective actions see section 4.7 of this manual.

3.3. MAINTENANCE:

Marco machines have been designed to give many years of trouble free service. Marco Beverage Systems manufacture and test to ISO9002:2000 standard. The only regular maintenance required is occasional de-scaling.

Descaling Procedure:

- Isolate machine from power supply.
- Isolate machine from water supply.
- ALLOW TO COOL COMPLETELY!
- Drain water from machine.
- Remove all lids.
- Remove as much scale as possible by hand, paying particular attention to level probes (White plastic with steel tab). Be very careful not to damage any attachments.
- Use ScaleKleen, Marco part No. 8000270 or similar. Follow instructions carefully.
- Thoroughly clean and flush the machine before re-use.
- Follow installation and first time operation instructions

3.4. CLEANING:

The exterior of these machines may be cleaned with a damp cloth and a light detergent. Do not use abrasive cloths or creams, as this will spoil the finish of the machine. Do not use a water jet or spray. Beware of accidentally operating the draw off tap or push button when cleaning the front of the machine.

3.5. LIMESCALE:

In common with all water boiler manufacturers, service calls resulting from limescale are not covered by warranty. Fitting a scale reducer is recommended, especially in hard water areas. This can reduce the build-up of scale but may not stop it altogether. The frequency that descaling is required depends on the local water supply; hard water areas need more attention. A scale reducer can reduce the build up of scaling, but may not stop it altogether. Descaling of the machine should ideally be carried out by qualified service personnel.

3.6. CAUTIONS AND SAFETY TIPS:

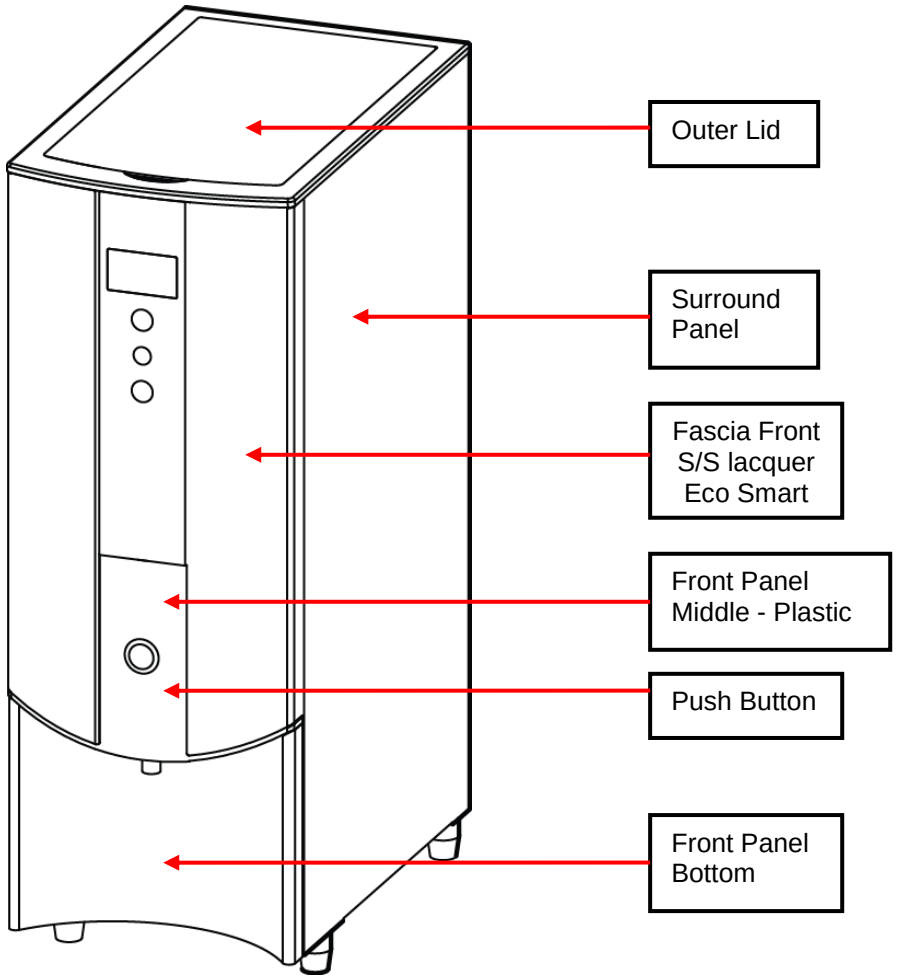
- This appliance must be earthed. If the moulded plug supplied is not used then ensure that the green/yellow cable is connected to a suitable earth.
- Risk of flooding. The hose supplied with this unit is non-toxic food quality tested to 190psi. However, a hose is not a permanent connection. It is, therefore, advisable to switch off boiler and close the stopcock valve when boiler is not in use, e.g. overnight, weekends etc.
- Risk of scalding. Beware of accidentally operating the water drawoff tap especially when cleaning the front of the boiler.
- The utmost care has been taken in the manufacture and testing of this unit. Failure to install, maintain and / or operate this boiler according to the manufacturer's instructions may result in conditions that can cause injury or damage to property. If in any doubt about the serviceability of the boiler always contact the manufacturer or your own supplier for advice.

4. Technical Data:

4.1. GENERAL DESCRIPTION:

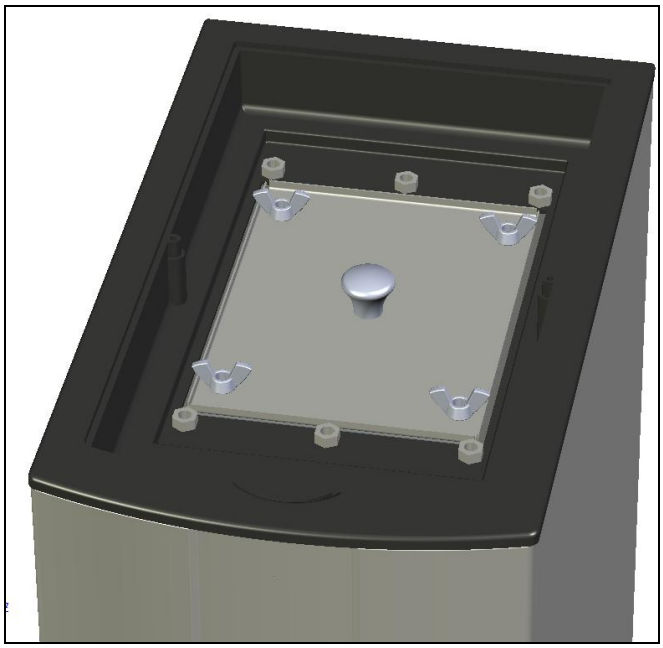
EcoSmart PB10 1000677 and 1000678.			
		1000677	1000678
Dimensions	Height (mm) Width (mm) Depth – counter footprint (mm) Depth incl. Drip Tray (mm) Height Dispense to Drip tray (mm)	590 210 360 460	**675** 210 360 460
Performance	Immediate Draw-Off (litres) Max. Hourly Output (litres/hour)	10 38	10 38
Electrical	Connection	2.8kW,230V, c/w 1.5m flex and moulded plug - fused (BS1363).	
Plumbing	Fittings Pressure	0.75” BSP Food grade inlet hose supplied 5-50 psi (35-345 kPa)	

4.2. EXTERNAL ARRANGEMENT:



4.3. ACCESS TO INTERNAL COMPONENTS:

To access the tank:

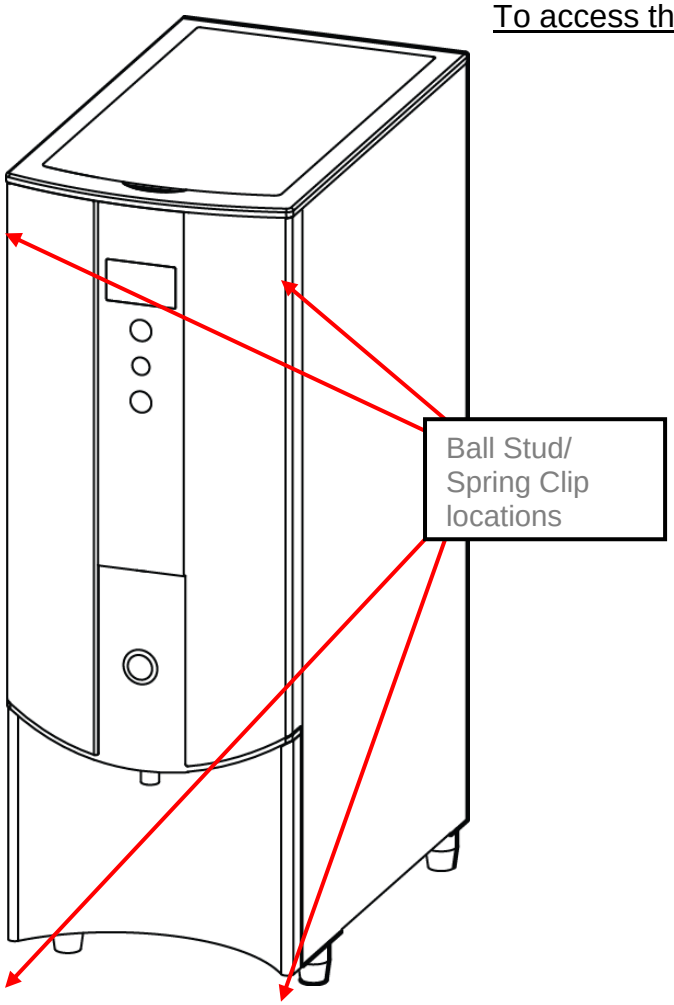


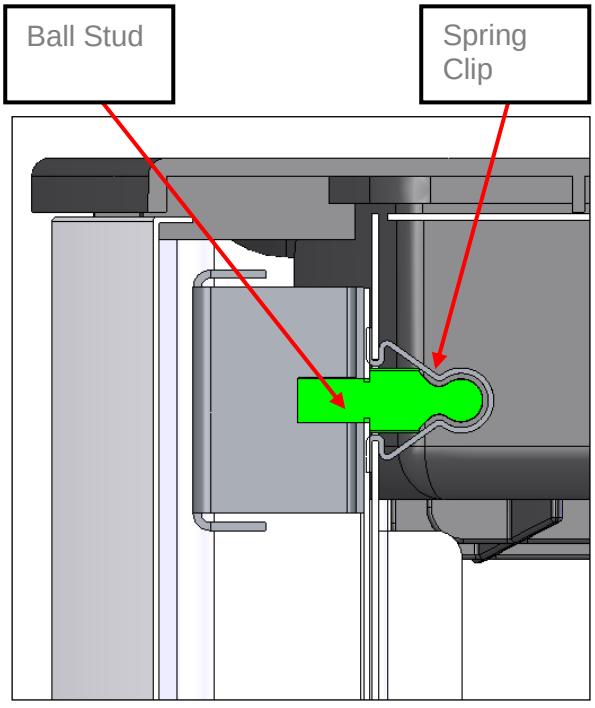
Allow to cool. Remove the outer lid.

Ensure that the tank is cool, before removing inner lid. To remove inner lid, undo 4 butterfly nuts

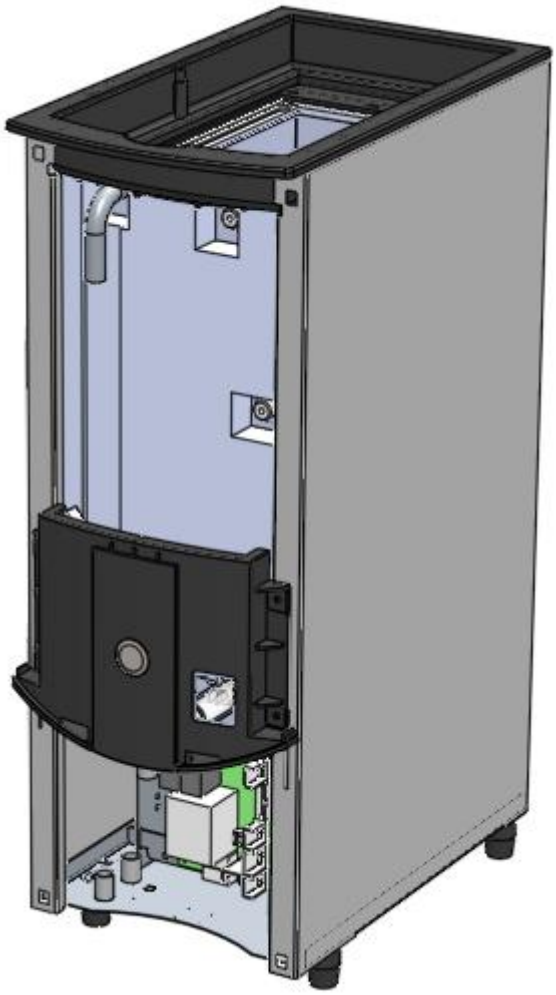
The tank is now accessible for cleaning.

To access the internal components:





- Disconnect the machine from the electrical supply.
- Allow to cool sufficiently.
- The metal Front Fascia Top and Bottom panels are fixed to the surround with ball studs that lock into spring clips mounted in the surround panel – refer to picture above.
- To separate the ball studs from the spring clips insert a flat headed screwdriver at the locations indicated on the picture and lever apart the front panels from the surround.
- To remove the Front Fascia Top panel, after seperating the ball stud from the spring clip, rotate the top edge of the panel forward and pull the panel in an upwards motion.
- Place the panel to the side of the machine
- To remove the Front Fascia Bottom, after seperating the ball stud from the spring clip, rotate the bottom edge of panel forwards and pull in a downward motion. This panel is now free to be placed out of the way.

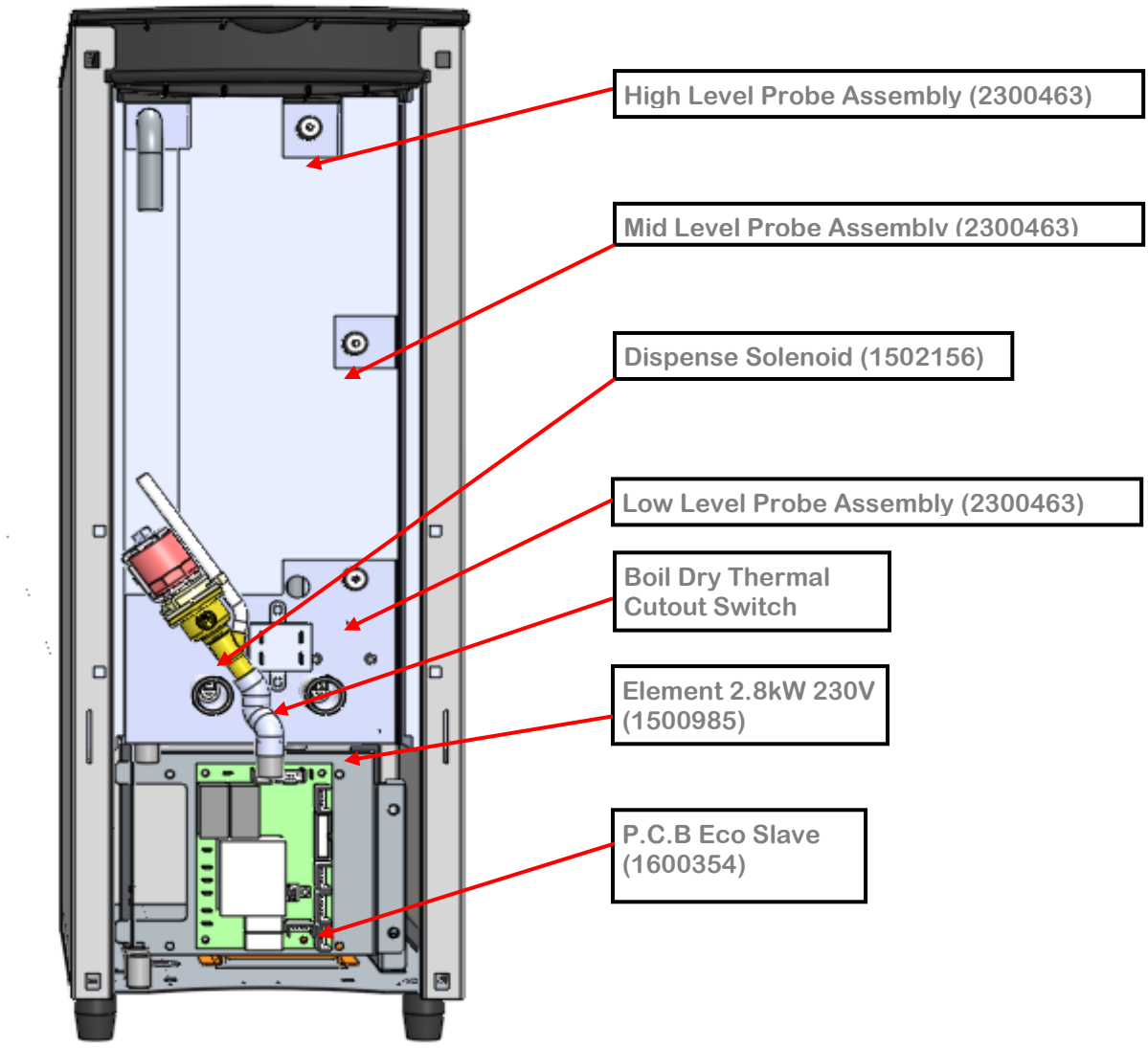


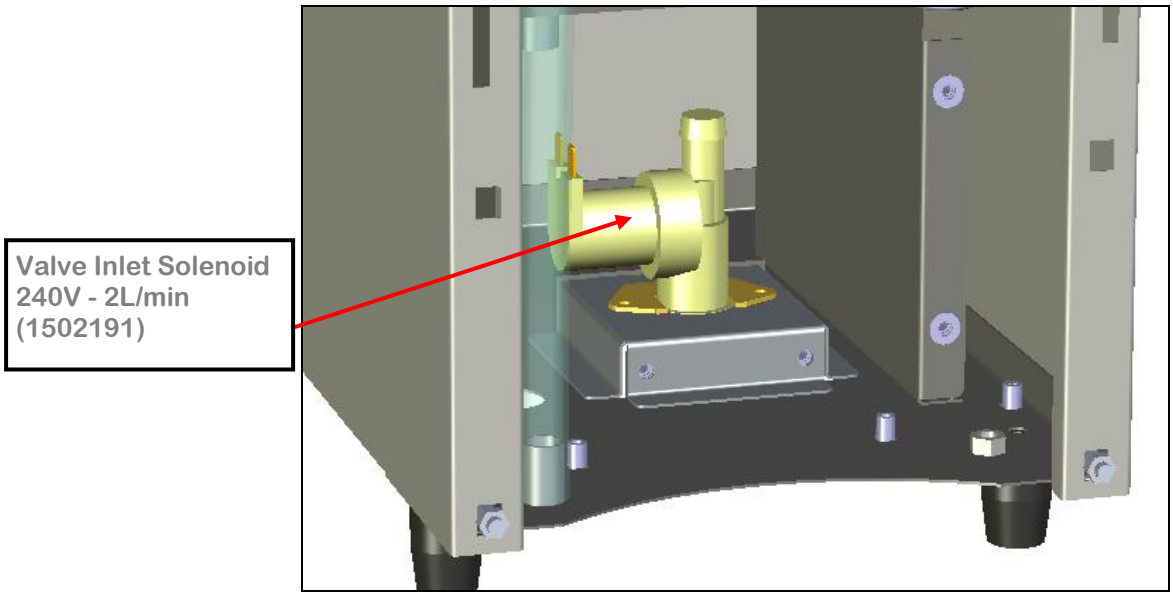
- This allows access to most of the internal components and the machine does not need to be drained for most maintenance or service operations.
- If further access is required, the plastic Front Fascia Middle panel should be removed by unscrewing the four cross recessed pan headed screws.
- The Tank can be drained by removing the plug from the end of the drain hose, and draining into an external drain or a large enough container.

Inlet Solenoid Access:

- To access the inlet solenoid, the PCB and PCB bracket need to be removed.
- Unscrew the two cross-recessed pan headed screws holding the bracket in place.

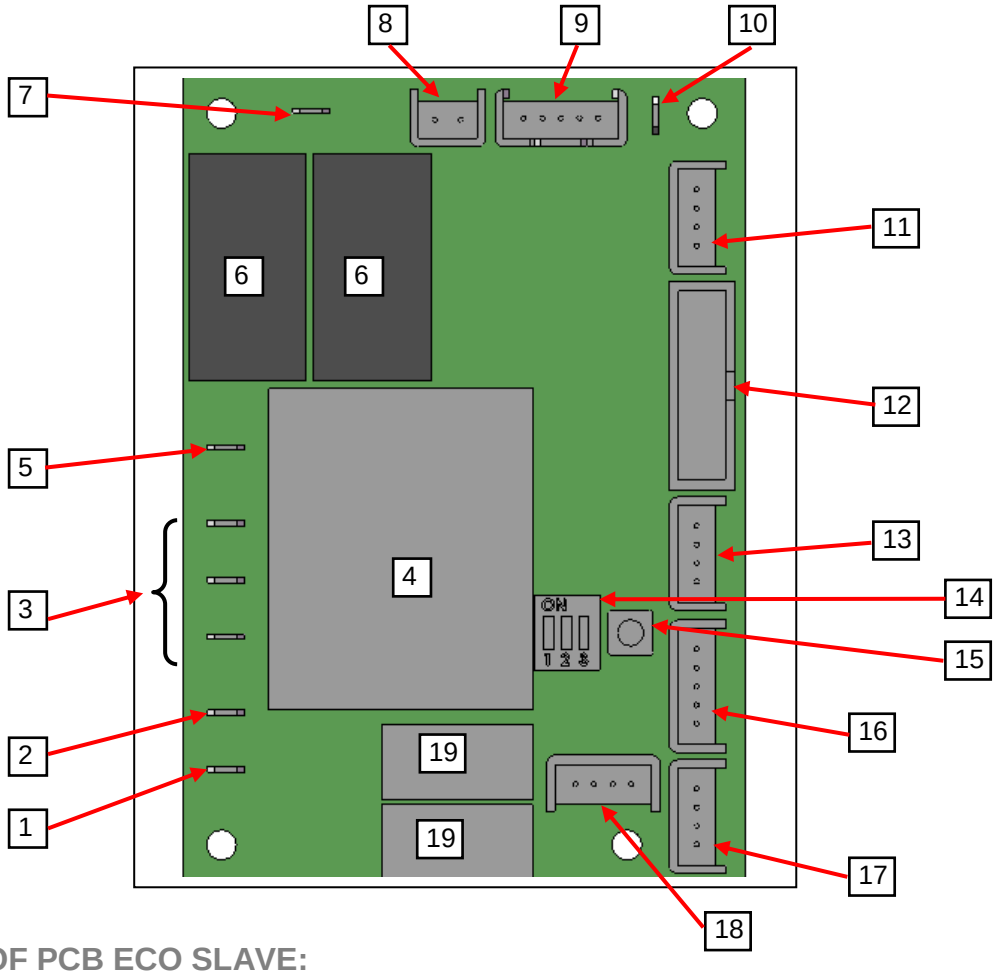
4.4. INTERNAL ARRANGEMENT:


High Level Probe Assembly (2300463)
Mid Level Probe Assembly (2300463)
Dispense Solenoid (1502156)
Low Level Probe Assembly (2300463)
Boil Dry Thermal Cutout Switch
Element 2.8kW 230V (1500985)
P.C.B Eco Slave (1600354)



4.5. PCBs:

.1. PCB Eco Slave 1600354:

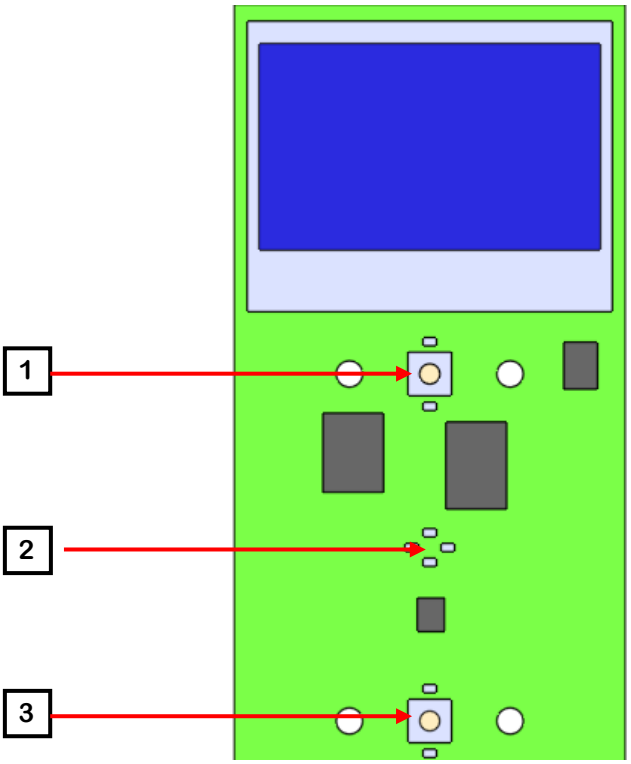


COMPONENTS OF PCB ECO SLAVE:

1. Dispense Solenoid Tab
2. Inlet Solenoid Tab
3. Neutral Tabs
4. Transformer
5. Mains Live In Tab
6. Relays - Heater
   - Switch the element
7. Heater Tab
8. On/Off 2-way Connector
   - Short circuited on this EcoSmart machines – power switch controlled through the display PCB
9. LED 5-way Connector
10. Earth Tab
11. Daughter PCB Connector (low voltage)
    - Connects to Daughter PCBs – allows switching of more than one element
12. Ribbon connector to Front Panel Display
13. Thermistor Connector
14. Dip Switch – 3 way – Non functioning in EcoSmart
15. Tactile Switch – non functioning in EcoSmart
16. Water Level – 5-way connector (low voltage)
    - Connects to Low level and High level probes. Also connects push button on some PB variants.
17. Button Connector – 4-way
18. Data I/O Connector – 4-way
19. Relays – Inlet Solenoid / Dispense Valve

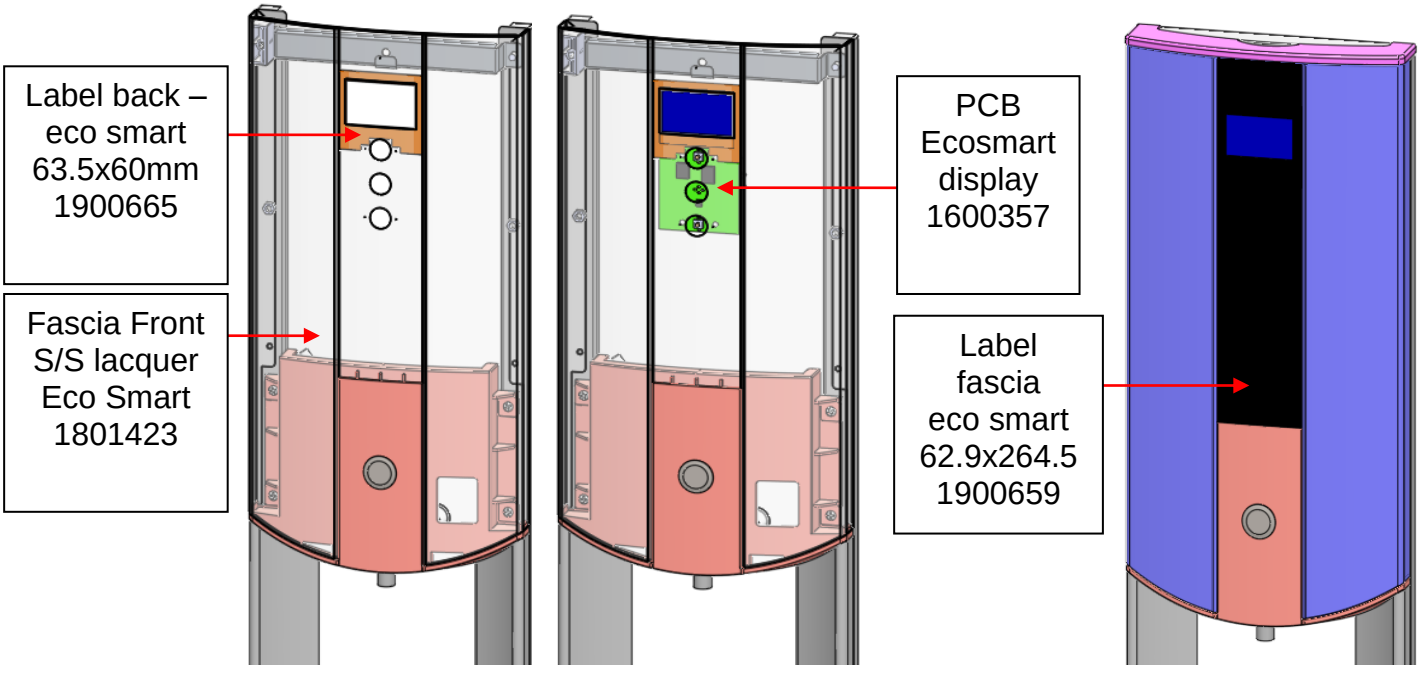
4.5.2 P.C.B Ecosmart Display 1600357

1. Power On/Off LED's and Button
   - shows that machine is switched on
2. Status LED's
   - displays Error signals via a flashing RED LED
3. Eco Mode On/Off LED's and Button



4.5.5 PCB Display Label Requirements 1000677 1000678

Replacing THE EcoSmart DISPLAY AND APPLYING LABELS.
The 1900665 is a very important label it must be applied
The 1900665 should rest above the PCB support studs attached to the back of the Ecosmart panel. The 1600357 PCB should be mounted onto the back of the Ecosmart panel with 5mm spacers (1401874) between the PCB and the panel. Peel off the protective foil from the top of the display board before assembly.
The 1900659 Label should then be attached to the front of the panel, make sure the transparent panel is scratch free before applying the label.


Label back – eco smart 63.5x60mm 1900665
Fascia Front S/S lacquer Eco Smart 1801423
PCB Ecosmart display 1600357
Label fascia eco smart 62.9x264.5 1900659

4.6. TROUBLESHOOTING – DIAGNOSTIC GUIDE:

NOTE FOR THE ECOSMART RANGE IN ADDITION TO THE STATUS LED FLASHING TO INDICATE AN ERROR – THE DISPLAY WILL ALSO PROVIDE INFORMATION

1 FLASH CYCLE – LOW LEVEL PROBE DISCONNECTED

Display pattern:

- 1 flash then a short pause - repeated.

Check and Action

- Check the wiring to the Low Level probe and the Probe inside the tank.
- Check probe connection to the lower PCB

2 FLASH CYCLE – BELOW LOW LEVEL

Display pattern:

- 2 flashes then a short pause - repeated.

Electronic check and action:

- This indicates that the low level circuit is open i.e. the probe is not in contact with the water.
- The element is switched OFF at this stage and the inlet is left ON.
  (note that if this is a low probe wiring fault, the water will stop at the high level probe regardless of the status of the low level).
- This is a recoverable error i.e. the machine does not need to be reset when the problem is solved. (e.g. if a closed mains water stop valve is the problem, opening the valve will allow water into the machine and normal function will resume when the low level probe is reached)

Probable causes:

1. The water level is below the low level probe, which is normal when the machine fills for the first time. (Can be flashing for up to 2 min at start up)
2. The low level probe wire is disconnected, or there is another wiring fault
   (eg. a bad earth (return) connection between the PCB and the Tank)

Action required:

1. Check that the water pressure is OK and ensure that the stop valve is open.
2. Check that the inlet solenoid is working.
3. If the water level is above the level of the low probe, check the probe circuit wiring

3 FLASH CYCLE – THERMISTOR SHORT CIRCUIT

Display pattern:

- 3 flashes then a short pause - repeated.

Electronic check:

- This indicates that the Thermistor is measuring zero resistance. It assumes the thermistor has failed sort circuit.
- The element and inlet valve are turned OFF when this error is detected
- This is a recoverable error. When the correct range of resistance is measured, normal operation resumes.

Probable causes:

1. The thermistor has failed.

Action required:

1. Replace the thermistor.

4 FLASH CYCLE – NOT HEATING

Display pattern:

- 4 flashes then a short pause - repeated.

Electronic check:

- This checks that the temperature is increasing when the heater is on.
- Measures the rate that the temperature increases in a specified time. This error is only displayed after 20 mins of the heater being on continuously. When the error is detected, the element and inlet valve are turned off.

- This is a non recoverable error. The machine needs to be reset when this problem is solved.

Probable causes:
1. The elements have failed
2. Wiring fault

Action required:
1. Check that the resistance on the elements. If there is a reasonable resistance (15-25Ω)on the element it probably has not failed, so the wiring might be at fault.

5 FLASH CYCLE – THERMISTOR OPEN CIRCUIT

Display pattern:
- 5 flashes then a short pause - repeated.

Electronic check:
- This indicates that the Thermistor is measuring such a large resistance that it assumes the thermistor circuit is open.
- The element and inlet valve are turned OFF when this error is detected
- This is a recoverable error. When the correct range of resistance is measured, normal operation resumes

Probable causes:
2. The thermistor probe is unplugged from the 4way connector on the PCB or the thermistor has failed open circuit.

Action required:
2. Check that the thermistor is plugged in to the PCB correctly. If it is, replace the thermistor.

6 FLASH CYCLE – NOT FILLING

Display pattern:
- 6 flashes then a short pause - repeated.

Electronic check:
- This checks that the water in the tank cools when the inlet solenoid valve is switched on. Indicating that water is entering the tank.

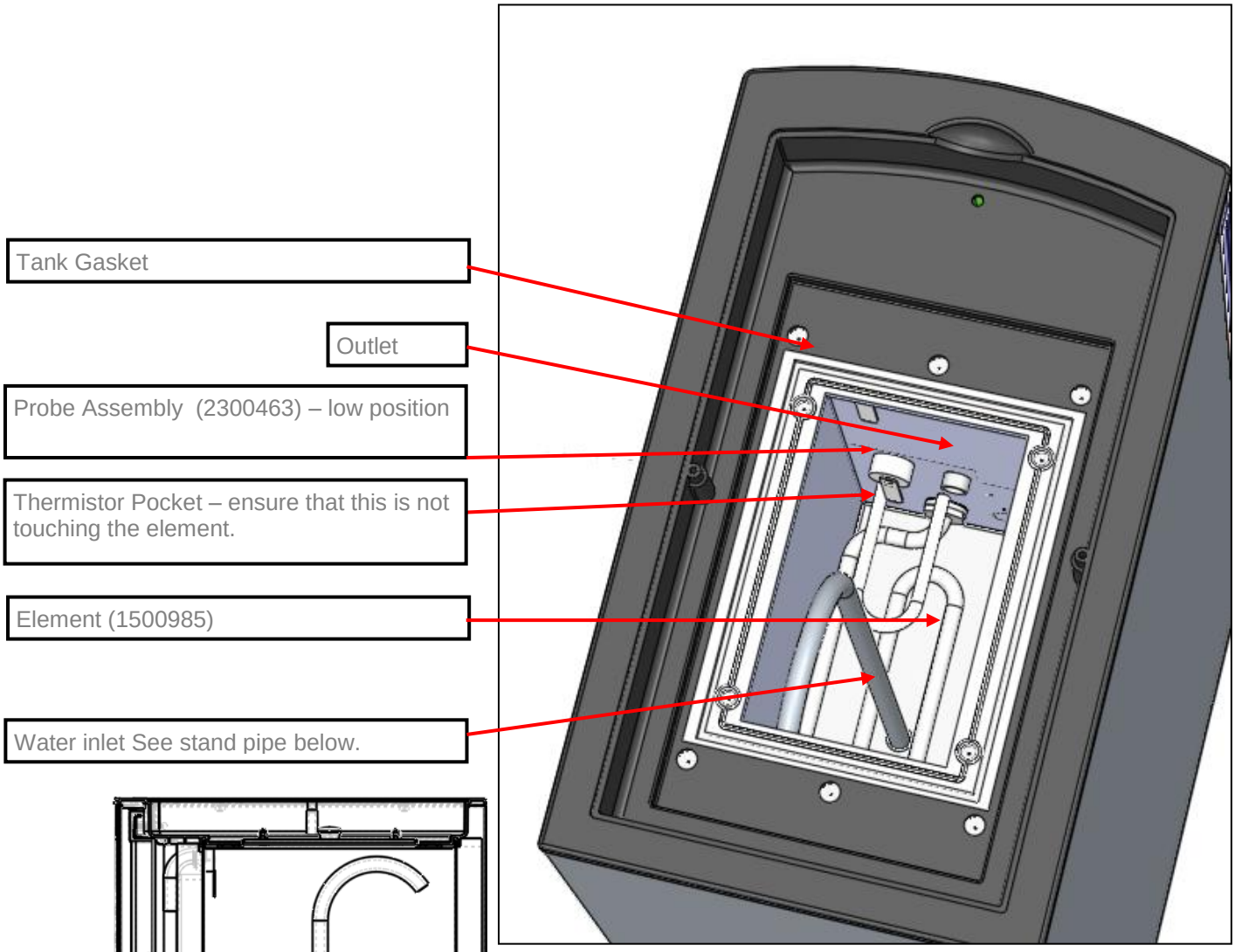
Probable causes:
1. Mains water pressure problem or the mains water stop valve is closed.
2. Inlet solenoid valve failure.

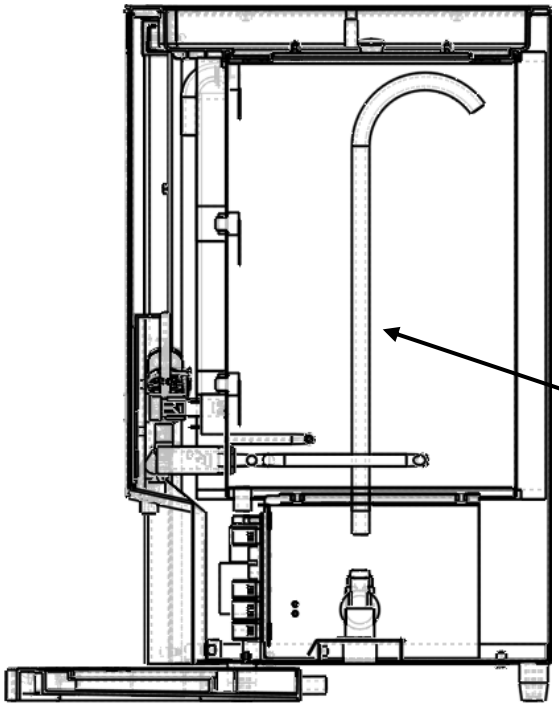
Action required:
1. Check the mains water supply. (Note: Temporary loss of water pressure can occur in certain sites – particularly when various machines are plumbed to the same mains water supply.)
   NOTE: If the water supply is the problem, ensure that this is rectified or this error will re-occur.
2. If there is no problem with the mains water supply, check that the inlet solenoid valve is working.

4.7. Tank Components

The tank internals are detailed below. Care should be taken when cleaning inside the tank.
The level probes provide much of the control inputs into the PCB and are critical to the operation of the machine. The wiring to these should be checked regularly and the probes themselves should be cleaned whenever the machine is serviced.
There are 3 level probes on the machine.

Only the low level probe is visible in the picutre.


Tank Gasket
Outlet
Probe Assembly (2300463) – low position
Thermistor Pocket – ensure that this is not touching the element.
Element (1500985)
Water inlet See stand pipe below.



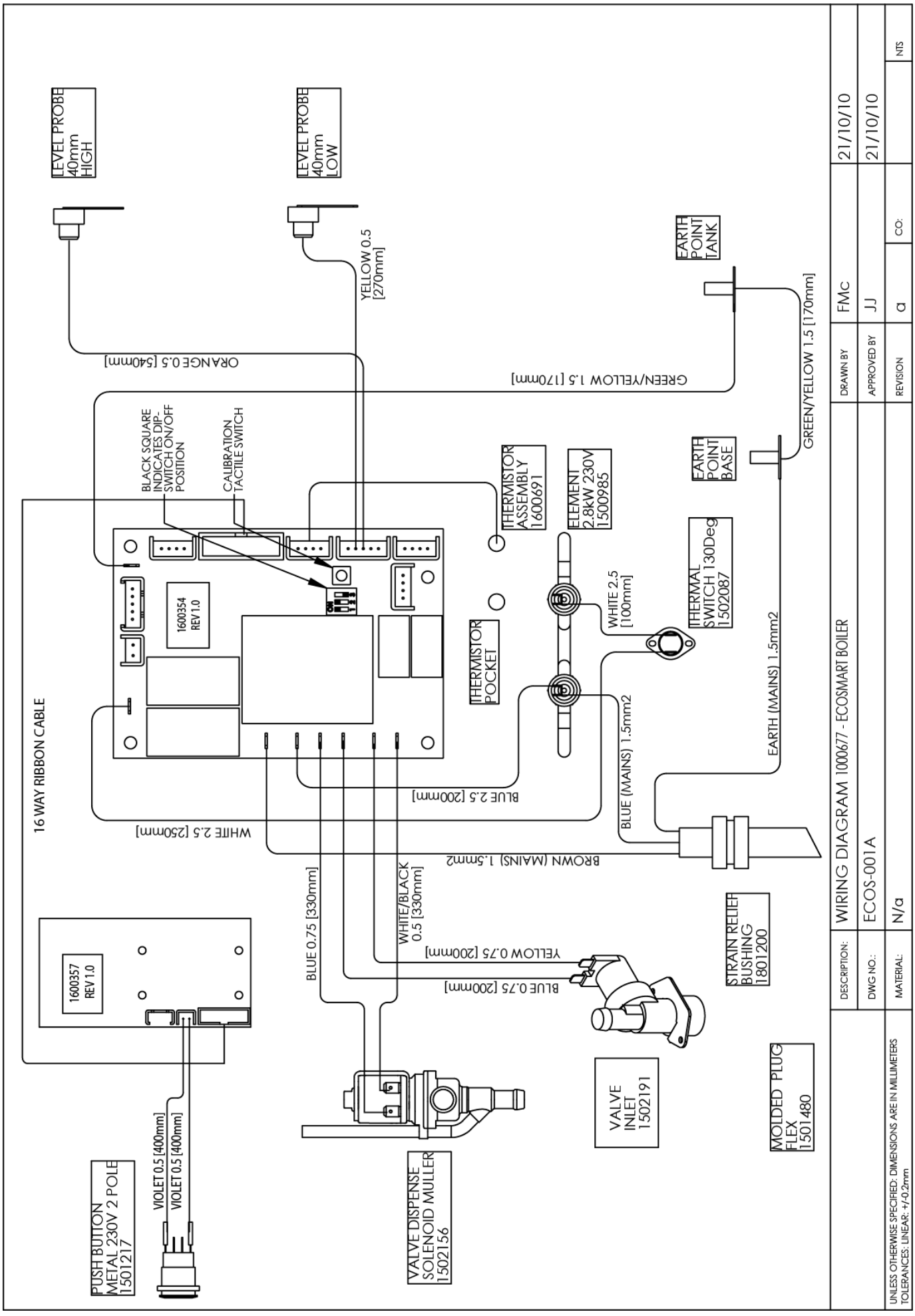
2300785
Ecosmart inlet stand pipe 3/8" OD
Note orientation

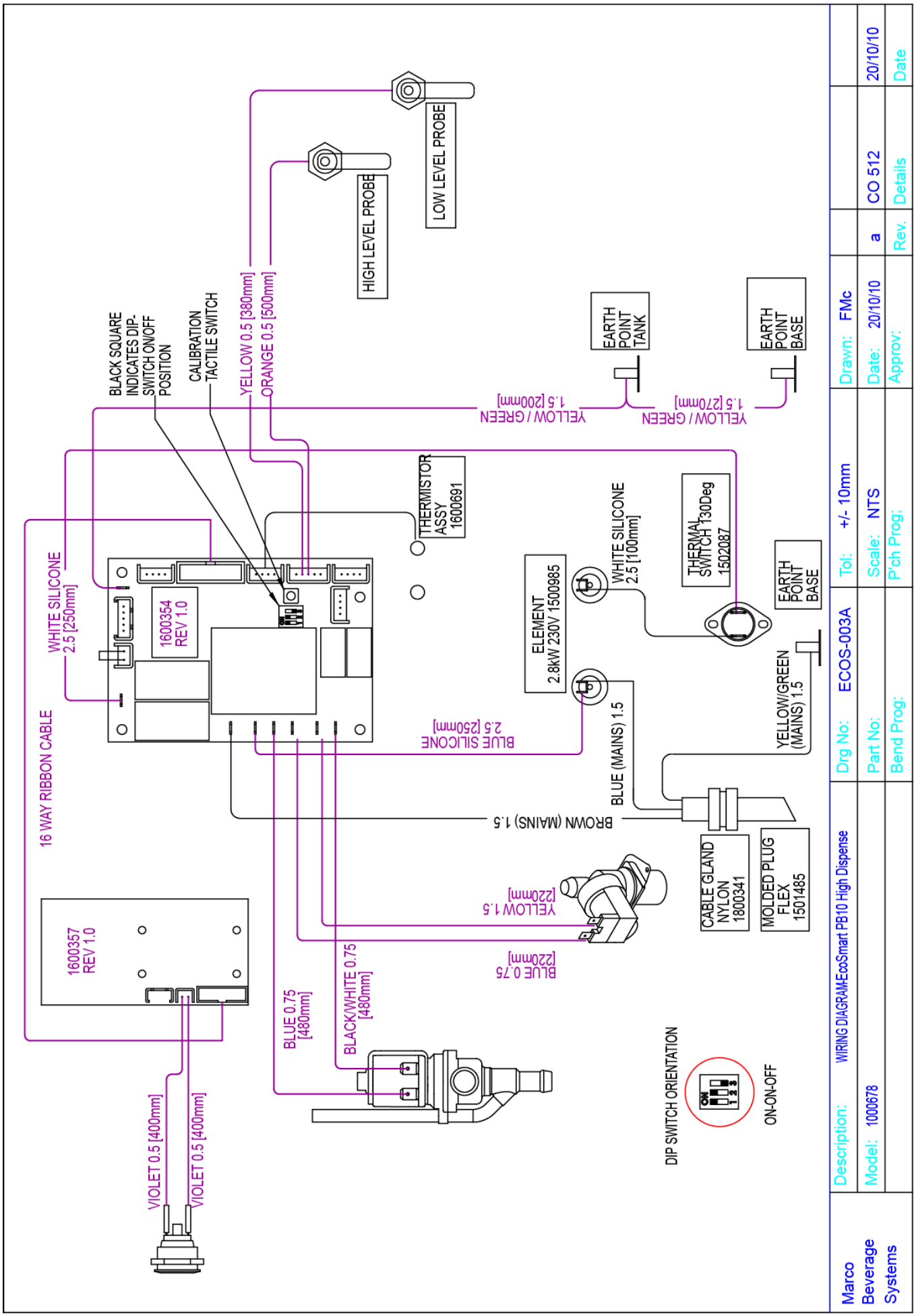
4.8. Descaling Procedure

To descale the machine thouroughly:

- Unplug the machine.
- Disconnect from the water supply.
- Drain as much water from the tank as possible.
- Remove the lids and allow the machine to cool completely.
- Drain all the water from the machine.
- Attempt to remove as much scale as possible by hand.
- Reconnect machine and start up once again.
- Add a descale solution (follow instructions as given). Flush the machine thouroughly before use

4.9. Wiring Diagram 1000677 and 10000678 EcoSmart PB10




LOW LEVEL PROBE
HIGH LEVEL PROBE
BLACK SQUARE INDICATES DIP-SWITCH ON/OFF POSITION
CALIBRATION TACTILE SWITCH
YELLOW 0.5 [380mm]
ORANGE 0.5 [500mm]
EARTH POINT TANK
EARTH POINT BASE
YELLOW / GREEN 1.5 [200mm]
YELLOW / GREEN 1.5 [270mm]
THERMISTOR ASSY 1600691
WHITE SILICONE 2.5 [100mm]
THERMAL SWITCH 130Deg 1502087
ELEMENT 2.8kW 230V 1500985
EARTH POINT BASE
WHITE SILICONE 2.5 [250mm]
1600354 REV 1.0
16 WAY RIBBON CABLE
BLUE SILICONE 2.5 [250mm]
BLUE (MAINS) 1.5
YELLOW/GREEN (MAINS) 1.5
BROWN (MAINS) 1.5
CABLE GLAND NYLON 1800341
MOLDED PLUG FLEX 1501485
YELLOW 1.5 [220mm]
BLUE 0.75 [220mm]
1600357 REV 1.0
BLUE 0.75 [480mm]
BLACK/WHITE 0.75 [480mm]
VIOLET 0.5 [400mm]
VIOLET 0.5 [400mm]
DIP SWITCH ORIENTATION
ON
1 2 3
ON-ON-OFF
Marco Beverage Systems
Description: WIRING DIAGRAM EcoSmart PB10 High Dispense
Model: 1000678
Drg No: ECOS-003A
Part No:
Bend Prog:
Tol: +/- 10mm
Scale: NTS
P'ch Prog:
Drawn: FMc
Date: 20/10/10
Approv:
a
Rev.
CO 512
Details
20/10/10
Date

4.13. Spare Parts List

Part Number	Description	Model Variant	
		1000677	1000678
1600354	P.C.B Eco Slave	x	x
1600357	P.C.B Ecosmart Display	x	x
1600357K	PCB 357 Spares Kit	x	x
1401874	Spacer Nylon 3.1x8x5mm (qty of 4 req.per machine)	x	x
1502191	Valve Inlet Solenoid 240V - 2L/min	x	x
1502156	Valve Dispense Solenoid Muller	x	x
1500985	Element 2.8kW 230V	x	x
1600691	Thermistor Assembly	x	x
2301463	Level Probe Assembly	x	x
1801423	Fascia Front S/S lacquer Eco Smart	x	x
1801427	Facia Plastic Middle Ecoboiler	x	x
1801428	Facia Front S/S Bottom Ecoboiler	x	x
2300271	Drip Tray Complete - Ecoboiler	x	x
2300384	Lid Inner Ecoboiler Complete	x	x
2300386	Lid Outer Ecoboiler Complete	x	x
1900659	Label fascia –eco smart 62.9 x 264.5	x	x
1900665	Label back –eco smart 63.5x60mm	x	x
1900397	Label Round P&H Hot Water	x	x
1800306	Gasket Inner – Ecoboiler	x	x
1800307	Gasket Outer – Ecoboiler	x	x
1501217	Push Button Metal 230V	x	x
1501430	Moulded Plug and cord	x	x
8800121	Descale Box – 6 Packs	x	x
8000240	Urn Cleanser (800g Tub)	x	x

MARCO is an ISO9001:2000 Registered Company.